IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

THE MAGNAVOX COMPANY, a Corporation, et al, Plaintiffs, v. BALLY MANUFACTURING CORPORATION, a Corporation, et al, Defendants.	CONSOLIDATED CIVIL ACTIONS NOS. 74 C 1030 74 C 2510

THE SEEBURG DEFENDANTS' REQUESTS FOR ADMISSION NOS. 251-256

The defendants herein request that the plaintiffs admit or deny, in accordance with the provisions of Rule 36 F.R.C.P., the following statements or opinions of facts and the genuineness of the documents described herein and/or attached hereto.

251. The Digital Equipment User Society (DECUS) publishes a number of documents relating to computers and computer programs.

252. The DECUS publication entitled "DECUS PROCEEDINGS 1962" is a publication.

253. The DECUS publication entitled "DECUS PROCEEDINGS 1962" is printed.

254. The DECUS publication entitled "DECUS PROCEEDINGS 1962" is a printed publication within the meaning of 35 U.S.C. §§102 and 103 as to the patents in suit.

255. The attached pages 37 through 39 are true copies of the article entitled "SPACE WAR! REAL TIME CAPABILITY OF PDP-1" contained in the DECUS PROCEEDINGS 1962.

256. The attached pages 37 through 39 constitute a prior art publication within the meaning of 35 U.S.C. §§102 and 103 as to the patents in suit.

Melvin M. Goldenberg
William T. Rifkin
McDougall, Hersh & Scott
135 South LaSalle Street
Chicago, Illinois 60603
Attorneys for the Seeburg Defendants

Dated: September 17, 1976

CERTIFICATE OF SERVICE

This is to certify that the foregoing THE SEEBURG DEFENDANTS' REQUESTS FOR ADMISSION NOS. 251-255 was served on plaintiffs by hand delivering one copy to their attorney, Theodore W. Anderson, Esq., Neuman, Williams, Anderson & Olson, 77 West Washington Street, Chicago, Illinois 60602 this 17th day of September, 1976.

Attorney for the Seeburg Defendants

SPACEWAR!
REAL-TIME CAPABILITY OF THE PDP-1

J. M. Graetz

bstract

The game starts with each player in control of a spaceship (shown on PDP scope) equipped with propulsion rockets, rotation gyros, and space torpedos. The use of switches to control apparent motion of displayed objects amply demonstrates the real-time capabilities of the PDP-1.

troduction

e demonstration program known as SPACEWAR! as first conceived in December, 1961 at an informal gathering of the Hingham Institute where ayne Wiitanen, Stephen Russell, and the author ere discussing some of the possibilities of the use the large-screen CRT which was to be attached the new PDP-1 computer at M.I.T. One idea at caught our fancy was the thought of a moving splay under the control of the user. We thought at a simulation of ships in space would provide excellent demonstration and the discussion deloped into the Hingham Institute Study Group on ace Warfare, under whose auspices almost all the work described here was done. The main ntrol and computation programs were written and bugged in the first months of 1962 by Stephen R. ssell of Harvard.

e program is set up in the form of a game for two rsons and a PDP-1. Each person has control over e of two displayed spaceship outlines. The object the game is to destroy the opponent's ship by sting him out of space with torpedos. Control maintained over the ship's orientation by simuting rotational gyroscopes. All translation is hieved with the ship's main drive rocket; the ship ll accelerate in the direction its nose is pointing long as the rocket engines are turned on. Both ips are armed with ballistic missiles (torpedos) hich are released from the nose of the ship with a locity equal to the ship's velocity plus that imted to the missile by the launcher. From then , the torpedos are in true ballistic flight. Each p has one other means of getting from one place another, namely "hyperspace," which allows m to get out of the way quickly.

The display includes a background of stars and a bright, flickering star or "heavy star" in the center of the scope which maintains a rather fierce gravitational field.

The Game

At the beginning of the game two spaceships, equipped with 31 torpedos, are displayed in diagonally opposite quadrants of the scope face. The players operate switches for the purpose of maneuvering into position for joining the fray. (It is unwise to remain in a single position for a very long time, and also fruitless, for the torpedos have only a limited range.) The torpedos have two types of fuze: one is a proximity fuze which causes the torpedo to explode when it comes within a certain critical distance of any other collidable object which will also be caused to explode. The other is a time fuze which causes the torpedo itself to explode if it has not encountered another object after a given length of time.

The "heavy star" in the center is constantly exerting a strong gravitational influence on the two spaceships (torpedos are not affected by gravity). This star also has a very short capture radius; a ship with reasonably large intrinsic velocity can come in quite close to the star without fear of being captured. This maneuver is frequently used to change direction rapidly.

If a ship is captured by this star, it loses all velocity and is thrust into the "anti-point," that point on the surface of a topologically toroidal scope which is represented by the four corners of the face.

All collidable objects explode on coming into critical range. The current rules require that a game is won only if the remaining ship (after the opponent has exploded) can successfully avoid being blown up by any torpedos which may be left over. A tie is declared: when both ships collide (and explode); when an apparent victor is destroyed by a loose torpedo; or when both ships run out of torpedos. (Each ship has 31 torpedos at the start of each game).

The Spaceships

The two ships have different outlines making them more easily distinguishable on the scope face. Rotation is readily apparent and rocket blast is equally detectable. When the ship is blasting, a fiery tail is seen at the base of the ship, where the main rocket exhaust is placed. The spaceship outlines are generated and displayed by a program written by Daniel Edwards of M.I.T. This program provides a very fast and reasonably flicker-free display. Torpedos appear as single moving dots. They resemble stars rather closely.

The Heavy Star

A bright, flickering point in the center of the scope represents the massive star referred to as the "heavy star." This star has a strong effect (which approximates gravitation) on the two spaceships. The program for this was also written by Daniel Edwards. In the final version of SPACEWAR! he is going to provide an improved integration to eliminate some of the more unexpected, albeit interesting, properties of the "heavy star."

The Stars of the Heavens

To add verisimilitude to the display, a background of stars is provided. At first, this was merely a random display of dots. However, Peter Samson of M.I.T. has written a program which displays a star map of the sky as seen from the Earth's equator. The size of the scope limits the extent of the map to a 45° segment of the heavens. Stars down to just above fifth magnitude are displayed. The display moves imperceptibly across the face of the scope from left to right, and, given time, the complete band of stars of this section of the map will be displayed.

Hyperspace

This is an emergency device. It frequently happens that a ship cannot accelerate fast enough to get out of the way of an approaching torpedo. The player may send the ship into hyperspace then. The ship then will disappear and very shortly will reappear somewhere else on the scope. Since this is a way of getting from one place to another without traveling the distance between, the method used must be hyperspace! Each player has exactly three hyperspace jumps.

On most PDP-1s, the ships are controlled by switches in the Test Word. For the M.I.T. machine, however, two control consoles were devised by Robert A. Saunders and Alan Kotok, both of M.I.T. Each console has a double-throw switch to control rotation, a firing button, and a blast lever. Hyperspace is entered by pushing the blast lever forward and releasing.

Acknowledgement

Special thanks from the Hingham Institute are extended to: the various members of the Tech Model Railroad Club for help and encouragement; to Prof. Jack B. Dennis, director of the M.I.T. TX-0 and PDP-1 installations, whose assistance went beyond the generous allowance of time on the computer; and, to Digital Equipment Corporation without whose gift SPACEWAR! would still be wishful thinking at the Hingham Institute.

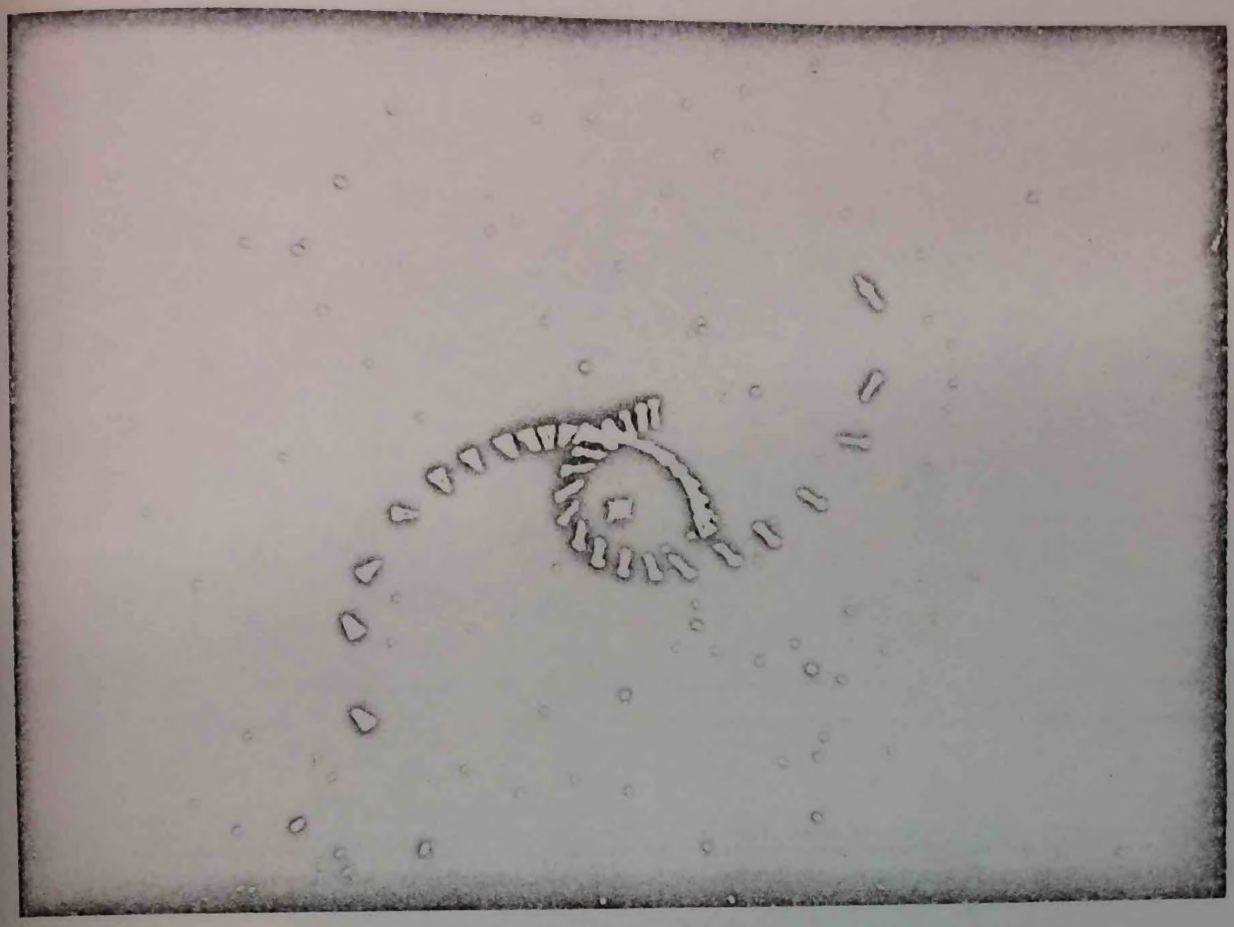

Figure 1 A Common Opening Maneuver